Catalogue of American Amphibians and Reptiles.

Berry, J.F. and J.B. Iverson. 2001. *Kinosternon leucostomum*.

Kinosternon leucostomum (Duméril and Bibron)
White-lipped Mud Turtle

Cinosternon leucostomum Duméril and Bibron, *in* Duméril and Duméril 1851:17. Type locality, "N.-Orleans; Mexique; Rio-Sumasinta (Amér. centr.):" ... "Amér. septentr." ... "Vallée de la Madeleine (N. [Nouvelle] Grenade [Colombia])," "Santa-Fé de Bogota (N. Grenade) [Colombia];" restricted by Schmidt (1941) to "Rio Usumacinta, Peten, Guatemala;" and subsequently restricted by Smith and Taylor (1950b) to "Cosamaloapam, Veracruz," México. Syntypes include at least Muséum National d'Histoire Naturelle, Paris (MNHN) 2114 (formerly 9087), a juvenile in alcohol without scutes from "Vallée de la Magdeleine, Nouvelle-Grenade," collected by J. Goudot in 1842 (examined by JBI); MNHN 9088 (formerly MNHN 8995), a dry mounted male from "Vallée de la Magdeleine, Nouvelle-Grenade," collected by J. Goudot in 1842 (examined by JBI); MNHN 9087 (formerly MNHN 8311), a dry mounted female from "Río-Sumasinta, Amérique Centrale," collected by A. Morelet in 1849 (examined by JBI); MNHN 2113, an alcoholic specimen from "Mexique," collector and date unknown (not examined by authors); MNHN 9502 (no former number), a stuffed specimen from "Vallée de la Magdeleine, Nouvelle-Grenada," collected by J. Goudot, date unknown (not examined by authors); and MNHN no number (lost), stuffed specimen from "Santa-Fé de Bogota, Nouvelle-Grenade," collected by B. Lewy in 1850 (not examined by authors). A lectotype, MNHN 8311 (now MNHN 9087), was designated by Stuart (1963).

Kinosternum leucostomum: LeConte 1854:183.

Kinosternon scorpioides: Gray 1855:44 (part).

Thyrosternum leucostomum: LeConte 1859:6.

Cinosternum leucostomum: Cope 1865:189.

Cinosternum leucosternum: Berendt, *in* Cope 1865:189.

Swanka scorpoides: Gray 1869:181 (part).

Swanka maculata Gray 1869:182. Type locality, "Mexico;" "Vera Paz [Guatemala];" restricted by Smith and Taylor (1950b) to "Cosamaloapam, Veracruz," México. Syntypes, British Museum of Natural History (BMNH) 1946.1.22.25 (formerly 1862.6.6.1), collected from "Cosamaloapan" by M. Sallé, date uncertain; and BMNH 1946.1.22.71–72 (formerly BMNH 1864.1.2.6.144–145), collected from "Verapaz" by G. Salvin, date uncertain (not examined by authors). Syntypes, BMNH 1946.1.22.73–74 (formerly BMNH 1862.6.6.2–3) from "Papalco Apoia" (= Cosamaloapam, Veracruz, México) are *Kinosternon acutum* (*fide* Smith and Smith 1979 [1980]).

Swanka leucostoma: Gray 1870:69.

Cinosternum brevigulare Günther 1885:17 (not *Cinosternum brevigulare* Cope 1885:389). Type locality, "Playa Vicente," Veracruz, México. Holotype, BMNH 1946.1.22.38 (formerly BMNH 1860.6.17.24), collected by M. Sallé (not examined by authors).

Cinosternum brevigulare Cope 1885:389 (not *Cinosternum brevigulare* Günther 1885:17). Type locality, "Tierra Caliente of Costa Rica at Sipurio, on the east coast." Cotypes (two mentioned in description), National Museum of Natural History (USNM) 51165, adult male shell, and USNM 45582, adult female in alcohol, collected by W.M. Gabb (date unknown) (examined by the authors). Cochran (1961) reported a third cotype, USNM 19797, from "Old Harbor, Costa Rica"

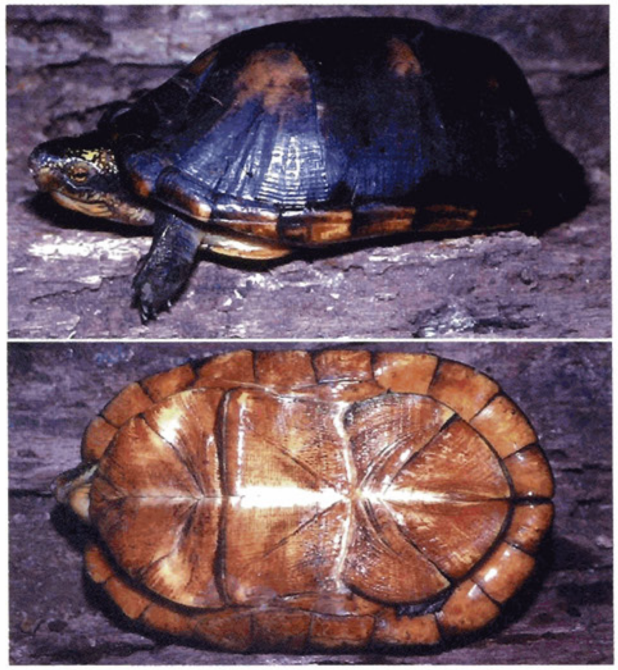


FIGURE 1. Adult male *Kinosternon leucostomum* from Panamá, Bocas del Toro Province, ca. 50 miles east of Bocas del Toro (photographs by John B. Iverson).



FIGURE 2. Adult male *Kinosternon leucostomum* from México, Veracruz, Estación de Biología Tropical "Los Tuxtlas" (photograph by R. Powell).



FIGURE 3. Adult female *Kinosternon leucostomum* from Belize, Belize District, Northern Highway at Mile 26 (left); adult female *K. leucostomum* from Colombia, Antioquia, Turbo (photographs by John B. Iverson).

(examined by JBI), although not cited by Cope (1885).

Cinosternum cobanum Günther 1885:18. Type locality, "Coban" and "Cahabon," Guatemala; restricted by Smith and Taylor (1950b) to "Cobán." Syntypes, BMNH 1946.1.22.18 (formerly BMNH 1875.2.26.5), a juvenile from "Coban," collected by O. Salvin, date of collection uncertain; and BMNH 1946.1.22.19 (formerly BMNH 1880.11.20.18), a juvenile from "Cahabon," collected by F.C. Sarg, date uncertain (not examined by authors).

Cinosternum postinguinale Cope 1887:23 (substitute name for *Cinosternum brevigulare* Cope 1885:389).

Cinosternon brevigulare: Atkinson 1907:152.

Cinosternon cobanum: Atkinson 1907:152.

Cinosternum spurrelli Boulenger 1913:1030. Type locality, "Peña Lisa, Condoto [Colombia], altitude 300 feet." Holotype, BMNH 1946.11.12.1 (formerly BMNH 1913.11.12.1), collected by Dr. H.G.F. Spurrell (not examined by authors).

Cinosternum cruentatum: Boulenger 1914: figure opposite p. 10 (part).

Kinosternon leucostomum: Stuart 1934:5 and Rust 1938:59. These were the first explicit uses of this combination, although Gray (1855) implied the combination by placement in the subgenus *Kinosternon* (Smith and Smith 1979 [1980]).

Kinosternon postinguinale: Schmidt 1946:4.

Kinosternon spurrelli: Schmidt 1946:5.

Kinosternon leucostomun: Maldonado-Koerdell 1953:133.

Kinosternun leucostomun: Alvarez del Toro 1960:20. *Ex errore*.

Kinosternon postinguinal: Legler 1965:621. *Ex errore.*

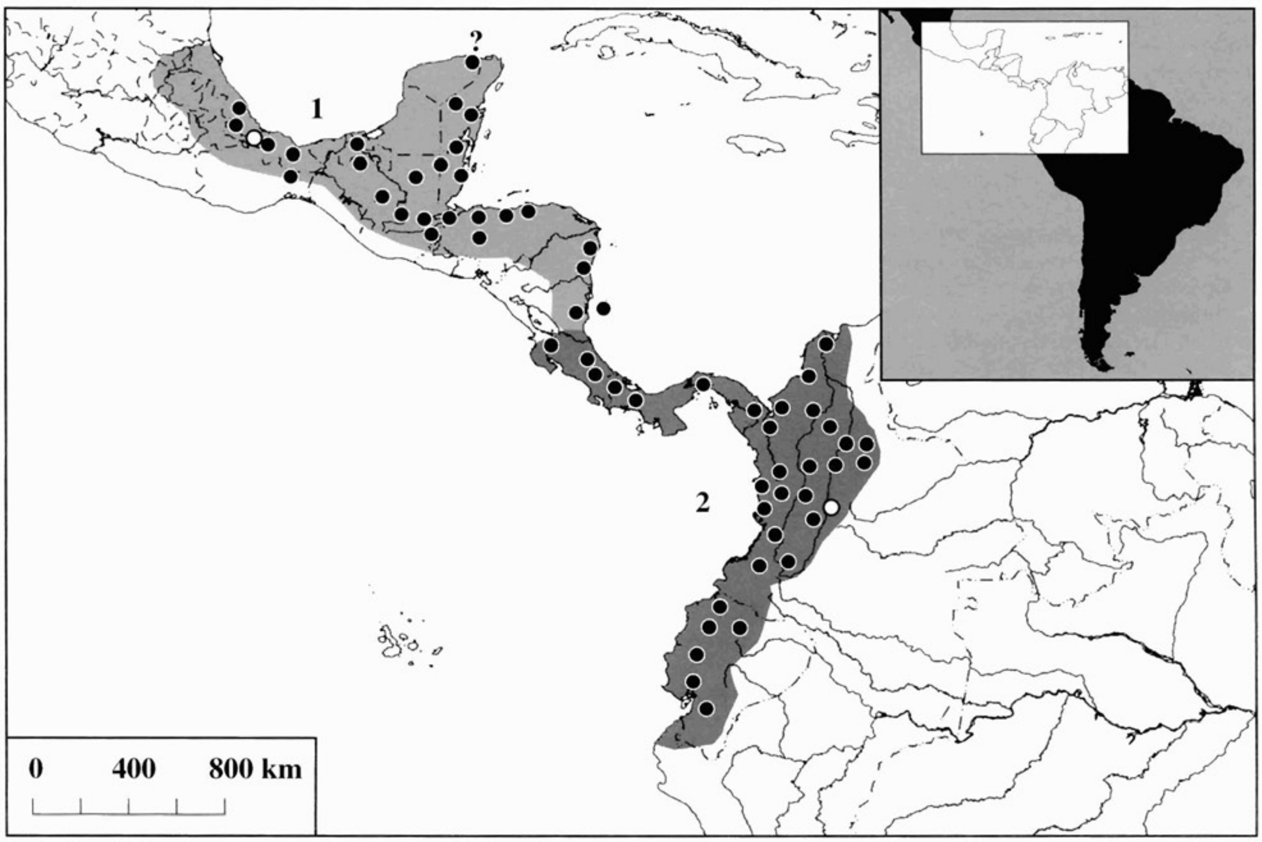
Kinosternon mopanum Neill 1965:117. Type locality, "Waha Leaf Creek, southern Stann Creek District, British Honduras [Belize]." Holotype, Museum of Comparative Zoology, Harvard University (MCZ) 71635, an adult female collected by the Monath party (specimen lost, *fide* Iverson 1976); placed into the synonymy of *K. leucostomum* by Iverson (1976).

Kinosternon leucostoma: Tryon 1975:34, 37. *Ex errore*.

• CONTENT. Two subspecies are currently recognized: *Kinosternon leucostomum leucostomum*, and *Kinosternon leucostomum postinguinale* (Berry 1978, Ernst and Barbour 1989, Iverson 1992).

• DEFINITION. *Kinosternon leucostomum* is a medium-sized *Kinosternon*, with males in some populations exceeding 175 mm in carapace length and females exceeding 165 mm. The carapace is unicarinate in all but the oldest, largest individuals, in which it is smooth. The first vertebral scutes nearly always (88.9%) contact the second marginal scutes. Eleventh marginal scutes are usually (74%) higher than the tenth, but the tenth is higher than the ninth. The shape of the carapace is approximately oval; the margins are distinctly flared outward in some populations, but only slightly flared in others. The carapace is dark straw, brown, or black in color, with darker interlaminal seams.

The plastron has two kinetic hinges located anterior and posterior to the abdominal scutes, with the anterior hinge more kinetic than the posterior hinge. The plastron completely closes the shell in individuals in most populations but not in some. Adult males nearly always have a smaller plastron than females. The plastron is concave in males but slightly convex or flat in females. The posterior plastral lobe is more or less evenly rounded, with an anal notch weak or absent. The gular scute is less than 60% of the length of the anterior lobe of the plastron. Inguinal and axillary scutes are usually (72.1%) not in contact. The plastron is yellow to brown in color, with darker interlaminal seams.



MAP. Distribution of *Kinosternon leucostomum*. Circles indicate type localities, and dots mark other records (some represent more than one proximate locality).

The dorsal head shield is rhomboidal, triangular, or occasionally V-shaped. The maxillary sheaths are weakly to strongly hooked, more strongly hooked in older males than in females or younger individuals. The color pattern on the head consists of a dark brown or gray ground color, with a broad yellow, cream, or brown stripe that extends from the rear margin of the orbit to the lateral surface of each side of the neck. Head stripes are most evident in juveniles and younger individuals, but often fade with age. The jaw sheaths are cream to yellow with darker vertical streaks most conspicuous in older males. The skin of other soft parts is gray or brown, usually with many small, darker spots. Two to three pairs of small gular barbels are present, with the most anterior pair the largest. Elevated patches of horny scales ("clasping organs" or "vinculae") are present on the posterior thigh and leg of males. Males have longer, more prehensile tails than do females; the cloacal aperture is at or posterior to the shell margin in males, but is anterior to the shell margin in females. The tails of both sexes have terminal spines, but the spine is larger in males.

• **DESCRIPTIONS.** General descriptions are in Alvarez del Toro (1982), Berry (1978), Boulenger (1889), Casas Andreu (1965, 1967), Ernst and Barbour (1989), Lee (1996, 2000), Medem (1957, 1962), Mertens and Wermuth (1955), Pritchard (1979a), Rogner (1996), Siebenrock (1906, 1907, 1909), Smith and Smith (1979 [1980]), and Wermuth and Mertens (1961, 1977). Specific descriptions include comparisons with other *Kinosternon* (*K. acutum* and *K. scorpioides,* Iverson 1976; *K. angustipons,* Legler 1965; and *K. dunni,* Medem 1961, Schmidt 1947), and descriptions of head nerves and musculature (Poglayen-Neuwall 1953), head muscles and laryngeal skeleton (Schumacher 1973), skull structure (Siebenrock 1897), hyoid apparatus (Siebenrock 1898), shell kinesis (Bramble et al. 1984), cervical vertebrae (Williams 1950), neural bone patterns (Iverson 1988a), skeletal elements (Acuña-Mesén et al. 1993), choanal structure (Parsons 1968; Parsons and Stephens 1967), penial morphology (Zug 1966), tongue and throat structure (Winokur 1988), cochlear nuclei (Miller and Kasahara 1979), rostral pores (Winokur and Legler 1974), and integumentary appendages (Winokur 1982).

• **ILLUSTRATIONS.** Color photographs are in Acuña-Mesén (1993, full body; 1998, head), Bonin et al. (1996, full body), Campbell (1998, full body), Freiberg (1981, dorsal view), Koshikawa (1996, full body), Lee (1996, 2000, full body and closeup of head), Mueller (1998, anterodorsal view), Pritchard (1967, 1979a, dorsal shell and head), Rogner (1996, anterior shell and head), Rudloff (1990, hatchling and egg), Stafford and Meyer (2000, full body and closeup of head), and Winokur (1969, head). Black and white photographs are in Alvarez del Toro (1960, 1982, dorsal views), Berry (1978, dorsal, ventral, and lateral views, and head), Boulenger (1914, mislabelled as *C. cruentatum*), Ernst and Barbour (1989, lateral and ventral views), Killebrew (1975, chromosomes), Medem (1962, lateral and ventral views), Mittermeier (1970, ventral view), Moll (1979, ventral shell and egg); Moll and Legler (1971, basking), Neill (1965, dorsal and ventral views), Obst (1986, lateral view), Poglayen-Neuwall (1990, dorsal view of deformed hatchling), Rust (1938, dorsal view), Sachsse (1980, dorsal view and eggs hatching), Schmidt (1947, ventral view), Schuster (1980, mating behavior, ventral and lateral views), and Winokur (1969, whole animal; 1988, dorsal view of tongue and pharynx). Black and white drawings are in Acúna-Mesén (1998, dorsal and ventral views), Boulenger (1889, dorsal, ventral, and lateral views of skull, and dorsal, ventral, and lateral views; 1913, dorsal and ventral views), Casas Andreu (1965, 1967, dorsal and ventral views), Duméril (1852, dorsal, ventral, and lateral views), Grassé (1970, copy of skull drawings from Kilias 1957), Günther (1885, dorsal, ventral, and lateral views of male and female), Hoffstetter and Gasc (1969, cervical vertebrae), Hutchison and Bramble (1981, plastron), Kilias (1957, dorsal and lateral skull drawings), Legler (1965, ventral and posterior views of shell, posterior view, and ventral and lateral views of skull), Mlynarski (1976, copy of skull and scute drawings from Boulenger 1889), Pritchard (1979a, dorsal, ventral, and lateral views of skull), Siebenrock (1907, ventral view of skull), Smith and Smith (1979 [1980], dorsal, ventral, and lateral views from Günther 1885), and Wermuth and Mertens (1961, dorsal, ventral, and lateral views of shell and skull).

• **DISTRIBUTION.** *Kinosternon leucostomum* occurs in various permanent, semipermanent, and temporary aquatic habitats, primarily at lower elevations throughout its range. The northernmost part of the species' distribution includes Gulf of Mexico drainages from Punta del Morro in central Veracruz, México to the Río Usamacinta. This species occurs in nearly all Caribbean drainages from the eastern Península de Yucatán to the ríos Atrato and Magdalena in Colombia, and in Pacific drainages from the Peninsula de Nicoya in Panamá, southward to west central Ecuador. Records for northwestern Perú (Pritchard 1984; Pritchard and Trebbau 1984) are unsubstantiated (Carr and Almendáriz 1990).

The general distribution of *Kinosternon leucostomum* was discussed by Berry (1978), Iverson (1986, 1992), Smith and Smith (1979 [1980]), Pritchard (1967, 1979a), Ernst and Barbour (1989), and Rogner (1996). Additional distributional information is available for México (Alvarez del Toro 1960, 1982; Baker et al. 1971; Barrera 1963; Campbell 1998; Casas Andreu 1965, 1967; Duellman 1965; Dugés 1894, 1896; Ferrari-Perez 1886; Flores et al. 1991; Gadow 1905, 1908; Hooper and Young 1986; Iverson 1988b; Lee 1980, 1996, 2000; Müller 1865; Paynter 1957; Pérez-Higareda 1978, 1980; Ramirez-Bautista 1978; Shreve 1957; Siebenrock 1906; Smith 1938, 1960a, 1960b; and Smith and Taylor 1950a, 1950b), Belize (Allen and Neill 1959, Campbell 1998, Henderson and Hoevers 1975, Iverson 1976, Lee 2000, Neill 1965, Neill and Allen 1959, Schmidt 1941, Stafford and Meyer 2000), Guatemala (Atkinson 1907; Campbell 1998; Duellman 1963; Lee 1996, 2000; Stuart 1934, 1935, 1943, 1948, 1963), Honduras (Meyer 1966, Meyer and Wilson 1973, Wilson and Cruz Díaz 1993), Nicaragua (Köhler 1999), Costa Rica (Acuña-Mésen 1993, 1998; Heyer 1967; Savage 1974; Wettstein 1934), Panamá (Mittermeier 1972; Moll and Legler 1971; Nemuras 1967, 1968; Netting 1936; Schmidt 1946), Colombia (Boulenger 1913; Dahl and Medem 1964; Dunn 1945; Medem 1957, 1960, 1962, 1965; Orces 1949; Schmidt 1947), and Ecuador (Boulenger 1882, 1891; Carr and Almendáriz 1990).

• **FOSSIL RECORD.** Fossils of *Kinosternon leucostomum* are not presently known.

• **PERTINENT LITERATURE. General reviews** are in Acuña-Mesén (1993, 1998), Berry (1978), Ernst and Barbour (1989), Morales-Verdeja and Vogt (1997a, 1997b), Pritchard (1979a), Rogner (1996), and Smith and Smith (1979 [1980]). Other important references are **habitat and ecology** (Alvarez del Toro 1960, 1982; Campbell 1998; Casas Andreau 1965, 1967; Duellman 1963; Iverson 1988b; Legler 1963, 1966, 1973, 1990; Medem 1962; Moll and Legler 1971; Morales-Verdeja and Vogt 1997a, 1997b; Neill and Allen 1959; Stuart 1948; Vogt 1981), **basking habits** (Boyer 1965), **population size** (Moll 1990), **presence in markets** (Mittermeier 1970), **longevity** (Flower 1925, Sachsse 1980, Slavens and Slavens 1994), **zoo holdings** (Slavens and Slavens 1994), **respiration** (Bagatto et al. 1997),

feeding and diet (Guzman and Vogt 1984, Legler 1966, Medem 1962, Moll 1990, Moll and Legler 1971, Summers et al. 1998, Villa 1973, Vogt 1985, Vogt and Guzman 1988), **predation** (Pérez-Higareda et al. 1989), **aggressive behavior** (Lardie 1983), **reproduction** (Ewert 1979; Legler 1966; Medem 1962; Moll 1979; Moll and Legler 1971; Morales-Verdeja and Vogt 1997a; Perez-Higareda 1981; Pritchard 1979a; Sachsse 1976, 1980; Schuster 1980; Tryon 1975, 1978; Vogt 1982, 1985; Vogt and Guzman 1988; Vogt and Villarreal 1993), **egg shape** (Iverson and Ewert 1991), **temperature dependent sex determination** (Ewert and Nelson 1991, Ewert et al. 1994, Vogt and Flores-Villela 1992), **captive breeding** (Duplaix-Hall and Biegler 1973, Lucas et al. 1972), **embryonic diapause** (Ewert 1991), **zoogeography** (Berry 1978; Lee 1980; Pritchard 1979b; Stuart 1934, 1935, 1943, 1948), **phylogeny** (Bramble et al. 1984; Iverson 1988a, 1991, 1998; Seidel et al. 1986), **body mass** (Iverson 1984), **chromosomes and karyotypes** (Bickham and Carr 1983; Bull et al. 1974; Gilboa 1975; Gorman 1973; Killebrew 1975; Moon 1972, 1974), **blood and blood proteins** (Frair 1972, 1977); **bacteria and parasites** (Dyer and Carr 1990; Hartdegen et al. 1999; Lamothe-Argumedo 1978; Platt 2000; Rojas-Espinosa et al. 1985; Thatcher 1963, 1966; Yamaguti 1958; Zerecero y D. 1948), **musk glands** (Waagen 1972), and **vernacular names** (Casas Andreu 1967, Iverson 1985, Liner 1994, Medem 1957, Mittermeier 1970, Mittermeier et al. 1980, Rust 1938).

• **ETYMOLOGY.** The specific name *leucostomum* is derived from the Greek root words *leucos*, meaning "white," and *stoma*, meaning "mouth," almost certainly in reference to the immaculate jaw sheaths that often are used as a diagnostic characteristic for the species—although this is an unreliable character at best (Berry 1978, Smith and Smith 1979 [1980]). The subspecific name *postinguinale* is a descriptive adjective derived from the Latin *inguinalis*, referring to the groin (inguinal scute in this case), and preceded by the prefix *post* meaning "after." Cope (1887) did not explicitly explain his use of the term *postinguinale*, but it probably refers to his earlier observation that the inguinal scute is located mostly behind the posterior hinge (Cope 1885).

1. *Kinosternon leucostomum leucostomum* (Duméril and Bibron)

Cinosternon leucostomum Duméril and Bibron, *in* Duméril and Duméril 1851:17 (part; "Mexique" and "Rio Sumasinta"). See species synonymy.
Kinosternon scorpioides: Gray 1855:44 (part; Sallé specimens).
Swanka maculata Gray 1869:182. See species synonymy.
Swanka scorpoides: Gray 1869:181 (part; Sallé specimens).
Cinosternum brevigulare Günther 1885:17–18 (not *Cinosternum brevigulare* Cope 1885:389). See species synonymy.
Cinosternum cobanum Günther 1885:18. See species synonymy.
Cinosternon brevigulare: Atkinson 1907:152.
Cinosternon cobanum: Atkinson 1907:152.
Kinosternon mopanum Neill 1965:117. See species synonymy.
Kinosternon leucostomum leucostomum: Berry 1979:3186. This was the first explicit use of this combination, although it had been implied previously by Hartweg (*in* Schmidt 1946) and Legler (1965), as discussed by Smith and Smith (1979 [1980]).

• **DEFINITION.** This subspecies has a relatively deep carapace and a relatively long gular scute (mean 15% of carapace length). The plastron is relatively large; mean plastron width at the anterior hinge is 73% of carapace width in both sexes, whereas the mean carapace width at midfemoral level is 69% of carapace width in males and 70% in females. The inguinal scute is relatively long (contacting the axillary scute in 27% of individuals). Clasping organs ("vinculae") are poorly developed in males and absent in females. The head pattern is variable, but light postorbital stripes are generally absent or obscure.

2. *Kinosternon leucostomum postinguinale* (Cope 1887)

Cinosternon leucostomum Duméril and Bibron, *in* Duméril and Duméril 1851:17 (part) "Vallée de la Madeleine (N. Grenade)" [Colombia]; ... "Santa Fé de Bogota (N. Grenada) [Colombia]." See species synonymy.
Cinosternum leucostomum: Cope 1865:189 (part: "Turbo, in New Grenade" [Colombia]).
Cinosternum brevigulare Cope:1885:389 (not *Cinosternum brevigulare* Günther 1885:17). See species account.
Cinosternum postinguinale Cope 1887:23 (substitute name for *Cinosternum brevigulare* Cope 1885:389).
Cinosternum spurrelli Boulenger 1913:1030. See species synonymy.
Kinosternon postinguinale: Schmidt 1946:4.
Kinosternon spurrelli: Schmidt 1946:5.
Kinosternon postinguinal: Legler 1965:621. *Ex errore*.
Kinosternon leucostomum postinguinale: Berry 1979:3186. This was the first explicit use of this combination, although it had been implied previously by Hartweg (*in* Schmidt 1946) and Legler (1965), as discussed by Smith and Smith (1979 [1980]).

• **DEFINITION**. This subspecies has a relatively depressed carapace, and a relatively short gular scute (mean length = 12% of carapace length). The plastron is relatively small; mean plastron width at the anterior hinge is 69% of carapace width in males and 71% in females, whereas the mean plastrom width at midfemoral level is 66% of carapace width in males and 68% in females. The inguinal scute is relatively short (contacting the axillary scute in 13% of individuals). Clasping organs ("vinculae") are well developed in males but absent in females. The head pattern is variable, but light postorbital stripes are generally well developed and distinct.

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